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10/585,099	09/28/2006	Klaus Endres	P30123	6063
7055 7590 12/22/2010 GREENBLUM & BERNSTEIN, P.L.C. 1950 ROLAND CLARKE PLACE RESTON, VA 20191				
EXAMINER EMPIE, NATHAN H				
ART UNIT		PAPER NUMBER		
1712				
NOTIFICATION DATE		DELIVERY MODE		
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

gbpatent@gbpatent.com

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### Office Action Summary

**Application No.**

10/585,099

**Applicant(s)**

ENDRES ET AL.

**Examiner**

NATHAN H. EMPIE

**Art Unit**

1712

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 7/6/10, 9/24/10.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 44-76 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 44-76 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-944)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submissions filed on 7/6/10 & 9/24/10 have been entered.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 44 - 76 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 44 and 56 have been amended to recite limitations on the first heat treatment of "to an end temperature of at least 350°C" (for A) and "to an end temperature of at least about 120°C" (for B). The Applicant's specification has only provided support for temperature ranges (for A) of "up to about 400" and "up to about 350°C" (which is interpreted as inclusive of all temperatures 400 / 350 and below). Thus there is inadequate support to include temperatures above such

recited temperatures (which a limitation of "at least 350°C" would include), and with respect to further limiting claims 45 and 59, there is inadequate support to selectively exclude temperature only below 350°C especially when an exemplary embodiment (example 1) appears to employ specifically those sub 350°C temperatures. The Applicant's specification has only provided support for temperature ranges (for B) of up to about 500°C, and up to about 200°C, and up to about 120°C (which is interpreted as inclusive of all temperatures at these temperature and below). Thus there is inadequate support to include all temperatures above these recited temperatures (which a limitation of "at least 120°C would include), and with respect to further limiting claims 47, 48, 61 and 62, there is inadequate support to selectively exclude temperatures only below 120°C especially when an exemplary embodiment (example 2) appears to employ specifically those sub 120°C temperatures.

The other dependent claims do not cure the defects of the claims from which they depend.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 44-45, 49-51, and 53-59, 63-66, 68-73, and 75-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mennig et al (US patent 6,162,498 as

supplied in applicant's IDS dated 2/5/07; hereafter Mennig) in view of Horne et al (US 2003/0118841; hereafter Horne).

Claim 44: Mennig teaches a process for making a metallic substrate having a vitreous coating (see, for example, abstract), wherein the process comprises;

(a) applying an alkali metal silicate-containing coating sol to the substrate to provide a coating layer on the substrate (see for example, abstract, and col 6 lines 14-56);

and (b) thermally densifying the coating layer of (a) by a heat treatment comprising, reaching a final thermal densification temperature of at least 300°C, further at least 400°C, and further at least 500°C in a variety of firing atmospheres including a low-oxygen atmosphere for full densification with formation of a vitreous layer (see, for example, col 4 lines 20-27, and abstract).

Mennig does not explicitly teach this densification process comprises a first stage heat treatment carried out in either (a) an oxygen –containing atmosphere to an end temperature of at least 350°C or (B) in a vacuum at a residual pressure of </ mbar to an end temperature of at least about 120°C.

Horne teaches a method of making silica glass articles and coatings from silica precursor solutions comprising full densification in an inert atmosphere (see, for example, abstract, [0294-0302]). Furthermore Horne teaches that prior to complete consolidation of the applied silica material, an intermediate densification process is conducted in an oxygen atmosphere at about 450°C to remove carbon contaminants (see, for example, [0300]). Therefore it would have been obvious to one of ordinary

skill in the art at the time of invention to have incorporated an intermediate (first) stage heat treatment carried out in an oxygen atmosphere prior to complete consolidation since such an incorporation would aid in removing carbon contaminants from the applied material.

Claim 45: Mennig in view of Horne teach the method of claim 44 wherein Horne has taught the heat treatment of the first stage is carried out at to aid in removal of carbon contaminant, (described above) as such the temperature of such a treatment is a result effective. Although Mennig in view of Horne have not explicitly taught wherein the end temperature is up to 400°C, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a temperature within the claimed range since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) and a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985).

Claim 49: Mennig further teaches wherein the heat treatment of the second stage (final treatment) is carried out at an end temperature of 500°C (see, for example, col 6 lines 42-45).

Claim 50: Mennig in view of Horne teaches the method of claim 49 (described above), and Mennig further teaches wherein the second stage of heat treatment is carried out at an end temperature based on the heat resistance of the underlying

metallic surface, and preferably at a temperature of least 500°C in an oxygen-free atmosphere (see, for example, col 4 lines 20 - 27). Although Mennig in view of Horne does not explicitly teach wherein the end temperature of the second stage is in the range from 540°C to 560°C it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated such an end temperature range since in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 51: Mennig further teaches wherein the heat treatment of the second stage is carried out in an inert gas atmosphere (see, for example, nitrogen or argon, col 4 lines 25-27).

Claim 53: Mennig further teaches wherein the thermally treating steps ((b)) are preceded by a drying of the applied coating layer (see, for example, col 4 lines 13-19, col 6, lines 35 – 45; wherein prior to experiencing the thermal densification treatment, a conventional drying treatment is conducted to obtain a dried layer).

Claim 54: Mennig further teaches wherein the alkali metal silicate-containing coating sol is obtainable by a process comprising a hydrolysis and polycondensation of one or more silanes of formula  $R_nSiX_{4-n}$  wherein the radicals X independently represent hydrolyzable groups or hydroxyl groups, the radicals R independently represent hydrogen, alkyl, alkenyl and alkynyl groups having up to 4 carbon atoms and aryl, aralkyl and alkaryl groups having from 6 to 10 carbon atoms, and n is 0, 1 or 2, with the proviso that at least one silane where  $n=1$  or 2 is used, or oligomers derived therefrom,

in the presence of (a) at least one compound selected from oxides and hydroxides of alkali metals and alkaline earth metals, and (b) optionally, nonsocial  $\text{SiO}_2$  particles (see, for example, abstract, and col 2 lines 58 – 66 wherein preferably up to 4 carbon atoms is taught).

Claim 55: Mennig further teaches wherein the at least one compound is used in such an amount that an atomic ratio Si : (alkali metal and/or alkaline earth metal) is in a range of from 15:1 to 10:1 (see, for example, col 3 lines 39-45).

Claim 56: refer to rejections of claim 44 and 53 (described above) wherein step (b) is satisfied by a teaching of getting a dried coating via a conventional drying treatment prior to the further claimed heat treatment.

Claims 57-58: Mennig further teaches wherein drying step (b) is conducted at room temperature, up to 80°C and up to 100°C explicitly (see, for example, col 4 lines 13-19)

Claim 59: see rejection of claims 45 and 56 (described above).

Claim 63: see rejection of claims 49 and 56 (described above).

Claim 64: see rejection of claims 50 and 63 (described above).

Claim 65: see rejection of claims 51 and 63 (described above).

Claim 66: Mennig further teaches wherein the second stage is performed at a residence time at maximum temperature of 60 minutes (1 hour) (see, for example, col 6 lines 44-45).

Claim 68: see rejections of claims 54 and 56 (described above).

Claim 69: see rejections of claims 55 and 68 (described above).



Claim 70: Mennig further teaches wherein the at least one compound is used in such an amount that an atomic ratio Si : ( alkali metal and/or alkaline earth metal) is in a range of from 15:1 to 10:1 (see, for example, col 3 lines 39-45).

Claims 71 and 72: Mennig further teaches wherein an average value of n in the silanes of formula (I) is from 0.5 to 1.0 (see, for example, col 2 lines 41-48).

Claim 73: Mennig further teaches wherein the thickness of the vitreous layer is 2 to 4 micron (See, for example, col 6 lines 46-47).

Claim 75: Mennig further teaches wherein the substrate has a structured surface (see, for example, col 5 lines 19 – 22; wherein the substrate surface is taught to possess a roughened surface structure achieved by roughening it).

Claim 76: Mennig further teaches the substrate as stainless steel, and steel (see, for example, col 5 lines 7 - 16).

Claims 46 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mennig in view of Horne as applied to claims 45 and 59 above, and further in view of Wizon (US patent 3,565,749; hereafter Wizon).

Claim 46: Mennig in view of Horne teach the method of claim 45 (Described above) wherein Horne had described the first heat treatment process conducted in an oxygen containing atmosphere for the purpose of removing carbon contaminants (described in rejection above), but Horne did not explicitly specify wherein the oxygen-containing atmosphere comprises from 15% to 90% by volume of oxygen. Wizon teaches a method of heat treating glass forming materials (see, for example, abstract,

col 1-2). Wizon further teaches that it is well known in the art that carbon components are similarly known to be burned off in oxygen containing atmospheres comprising about 20% by volume of oxygen (air) prior to densifying the remaining ceramic material (See, for example, col 4 lines 42-73). As both Wizon and Mennig in view of Horne teach methods directed to burning off carbon components from subsequently sintered silica containing glasses it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated an air atmosphere (about 20% by volume of oxygen) as such an atmosphere possess sufficient oxygen to predictably remove carbon contaminants, and additionally would be less expensive to supply than other specifically controlled O<sub>2</sub> environments.

Claim 60: see rejection of claims 46 and 59 (described above).

Claims 52 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mennig in view of Horne as applied to claim 44/56 above, and further in view of Chou et al ("Sol-Gel-Derived Hybrid Coatings for Corrosion Protection" in J. Sol-Gel Sci. and Tech. 26, pg 321-327, 2003).

Claim 52: Mennig in view of Horne teaches the method of claim 44 (described above); wherein Mennig further teaches sol-gel derived silicon based coatings are used to protect steel surfaces (see, for example, col 1 lines 1 - 58, and col 6 lines 35-57). Mennig further has taught a method of preparing such coatings wherein the densification of such coatings is important (see, for example, col 6 lines 35-57), but is silent as to the specific cooling conditions for the coating process, so Mennig and Horne

does not explicitly teach the process further comprises cooling the heat-treated substrate at a cooling rate of from 1 to 10 K/min. Chou teaches a method of forming sol-gel derived silicon based coatings intended to protect steel surfaces (see, for example, abstract). Chou has further taught wherein the cooling rate will influence densification, and wherein a suitable cooling rate to predictably densify a sol-gel derived silicon based coatings on a steel surface is a rate of 5°C / min (5 K/min) (see, for example, pg 323). When a primary reference is silent as to a certain detail, one of ordinary skill would be motivated to consult a secondary reference which satisfies the deficiencies of the primary reference; both Mennig in view of Horne and Chou teach method of forming sol gel derived silicon based coatings intended to protect steel surfaces, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a cooling rate of 5K/min in order to achieve the predictable result of forming a dense sol-gel derived protective silica coating on a steel surface.

Claim 67: see rejections of claims 52 and 56 (described above).

Claim 74 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mennig in view of Horne as applied to claim 44 above, and further in view of Callister, Materials Science and Engineering: An Introduction, 5th ed. (c) 2000, John Wiley & Sons, Inc. pg 169-171; hereafter Callister).

Claim 74: Mennig in view of Horne teaches the method of claim 44, wherein a protective coating is taught to be formed on a metallic substrate such as steel (see,

rejection above), but Mennig in view of Horne are silent as to how the metallic substrate is formed so neither explicitly teach wherein the substrate has been subjected to a cold forming. Callister teaches that cold forming (strain hardening / cold working) is a well known metallurgical process, which predictably improves a metal articles (such as steel) strength and hardness properties when conducted (see, for example, pg 169-171). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a substrate that has been subjected to a cold forming since such an incorporation would improve the metals strength and hardness, increasing the articles possible uses to situations requiring such properties.

Claims 44, 47-51, 53-58, 61-66, 68-73, and 75-76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mennig in view of Loxley et al. (US patent 6,012,304; hereafter Loxley).

Claims 44, 47, and 48 partial: Mennig teaches a process for making a metallic substrate having a vitreous coating (see, for example, abstract), wherein the process comprises;

(a) applying an alkali metal silicate-containing coating sol to the substrate to provide a coating layer on the substrate (see for example, abstract, and col 6 lines 14-56);

and (b) thermally densifying the coating layer of (a) by a heat treatment comprising, reaching a final thermal densification temperature of at least 300°C, further at least 400°C, and further at least 500°C in a variety of firing atmospheres including a

low-oxygen atmosphere for full densification with formation of a vitreous layer (see, for example, col 4 lines 20-27, and abstract).

Mennig does not explicitly teach this densification is a two step process comprising a first stage heat treatment carried out in either (A) an oxygen –containing atmosphere to an end temperature of at least 350°C or (B) in a vacuum at a residual pressure of  $\leq$  15 mbar to an end temperature of at least about 120°C.

Loxley teaches a method of making silica glass articles and coatings from silica precursor solutions comprising final full densification in an inert atmosphere (see, for example, abstract, col 9 line 30—col 10 line 57). Furthermore Loxley teaches that prior to complete densification of the silica material in inert atmosphere, an intermediate densification process is conducted at temperature below the final densification temperature in a vacuum environment preferably below 5 torr (~6.66 mbar) as such an intermediate step improves the densification of the final sintered product (see, for example, col 9 line 30—col 10 line 57). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated an intermediate (first) stage heat treatment at a temperature below that of the final densification temperature of Mennig and carried out in a vacuum at a residual pressure of less than 6.66 mbar as such an intermediate step would improve the over all densification of the final heated product.

By incorporation, the intermediate (first) stage of heat treatment would be conducted at a temperature of less than 300°C, further less than 400°C, and further less than 500°C; although the exact temperature of the first heat treatment is not explicitly

taught as at least about 120°C, and further up to about 500°C, or up to about 200°C it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a temperature within the claimed range since in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 48 continued: Mennig in view of Loxley teaches the method of claim 47 (described above, as well as limitation in 48 with respect to temperature) wherein the residual pressure is taught to be less than 6.66 mbar (5 Torr), although such a recited range is not explicitly <5 mbar, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a residual pressure within the claimed range since in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 49: Mennig further teaches wherein the heat treatment of the second stage (final treatment) is carried out at an end temperature of 500°C (see, for example, col 6 lines 42-45).

Claim 50: Mennig in view of Loxley teaches the method of claim 49 (described above), and Mennig further teaches wherein the second stage of heat treatment is carried out at an end temperature based on the heat resistance of the underlying metallic surface, and preferably at a temperature of least 500°C in an oxygen-free atmosphere (see, for example, col 4 lines 20 - 27). Although Mennig in view of Loxley does not explicitly teach wherein the end temperature of the second stage is in the

range from 540°C to 560°C it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated such an end temperature range since in the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Claim 51: Mennig further teaches wherein the heat treatment of the second stage is carried out in an inert gas atmosphere (see, for example, nitrogen or argon, col 4 lines 25-27).

Claim 53: Mennig further teaches wherein the thermally treating steps ((b)) are preceded by a drying of the applied coating layer (see, for example, col 4 lines 13-19, col 6, lines 35 – 45; wherein prior to experiencing the thermal densification treatment, a conventional drying treatment is conducted to obtain a dried layer).

Claim 54: Mennig further teaches wherein the alkali metal silicate-containing coating sol is obtainable by a process comprising a hydrolysis and polycondensation of one or more silanes of formula  $R_nSiX_{4-n}$  wherein the radicals X independently represent hydrolyzable groups or hydroxyl groups, the radicals R independently represent hydrogen, alkyl, alkenyl and alkynyl groups having up to 4 carbon atoms and aryl, aralkyl and alkaryl groups having from 6 to 10 carbon atoms, and n is 0, 1 or 2, with the proviso that at least one silane where n=1 or 2 is used, or oligomers derived therefrom, in the presence of (a) at least one compound selected from oxides and hydroxides of alkali metals and alkaline earth metals, and (b) optionally, nonsocial  $SiO_2$  particles

(see, for example, abstract, and col 2 lines 58 – 66 wherein preferably up to 4 carbon atoms is taught).

Claim 55: Mennig further teaches wherein the at least one compound is used in such an amount that an atomic ratio Si : (alkali metal and/or alkaline earth metal) is in a range of from 15:1 to 10:1 (see, for example, col 3 lines 39-45).

Claim 56: refer to rejections of claim 44 and 53 (described above) wherein step (b) is satisfied by a teaching of getting a dried coating via a conventional drying treatment prior to the further claimed heat treatment.

Claims 57-58: Mennig further teaches wherein drying step (b) is conducted at room temperature, up to 80°C and up to 100°C explicitly (see, for example, col 4 lines 13-19)

Claim 61: see rejection of claims 47 and 56 (described above).

Claim 62: see rejection of claims 48 and 56 (described above).

Claim 63: see rejection of claims 49 and 56 (described above).

Claim 64: see rejection of claims 50 and 63 (described above).

Claim 65: see rejection of claims 51 and 63 (described above).

Claim 66: Mennig further teaches wherein the second stage is performed at a residence time at maximum temperature of 60 minutes (1 hour) (see, for example, col 6 lines 44-45).

Claim 68: see rejections of claims 54 and 56 (described above).

Claim 69: see rejections of claims 55 and 68 (described above).



Claim 70: Mennig further teaches wherein the at least one compound is used in such an amount that an atomic ratio Si : (alkali metal and/or alkaline earth metal) is in a range of from 15:1 to 10:1 (see, for example, col 3 lines 39-45).

Claims 71 and 72: Mennig further teaches wherein an average value of n in the silanes of formula (I) is from 0.5 to 1.0 (see, for example, col 2 lines 41-48).

Claim 73: Mennig further teaches wherein the thickness of the vitreous layer is 2 to 4 micron (See, for example, col 6 lines 46-47).

Claim 75: Mennig further teaches wherein the substrate has a structured surface (see, for example, col 5 lines 19 – 22; wherein the substrate surface is taught to possess a roughened surface structure achieved by roughening it).

Claim 76: Mennig further teaches the substrate as stainless steel, and steel (see, for example, col 5 lines 7 - 16).

Claims 52 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mennig in view of Loxley as applied to claim 44/56 above, and further in view of Chou et al ("Sol-Gel-Derived Hybrid Coatings for Corrosion Protection" in J. Sol-Gel Sci. and Tech. 26, pg 321-327, 2003).

Claim 52: Mennig in view of Loxley teaches the method of claim 44 (described above); wherein Mennig further teaches sol-gel derived silicon based coatings are used to protect steel surfaces (see, for example, col 1 lines 1 - 58, and col 6 lines 35-57). Mennig further has taught a method of preparing such coatings wherein the densification of such coatings is important (see, for example, col 6 lines 35-57), but is

silent as to the specific cooling conditions for the coating process, so Mennig and Loxley does not explicitly teach the process further comprises cooling the heat-treated substrate at a cooling rate of from 1 to 10 K/min. Chou teaches a method of forming sol-gel derived silicon based coatings intended to protect steel surfaces (see, for example, abstract). Chou has further taught wherein the cooling rate will influence densification, and wherein a suitable cooling rate to predictably densify a sol-gel derived silicon based coatings on a steel surface is a rate of 5°C / min (5 K/min) (see, for example, pg 323). When a primary reference is silent as to a certain detail, one of ordinary skill would be motivated to consult a secondary reference which satisfies the deficiencies of the primary reference; both Mennig in view of Loxley and Chou teach method of forming sol gel derived silicon based coatings intended to protect steel surfaces, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a cooling rate of 5K/min in order to achieve the predictable result of forming a dense sol-gel derived protective silica coating on a steel surface.

Claim 67: see rejections of claims 52 and 56 (described above).

Claim 74 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mennig in view of Loxley as applied to claim 44 above, and further in view of Callister.

Claim 74: Mennig in view of Loxley teaches the method of claim 44, wherein a protective coating is taught to be formed on a metallic substrate such as steel (see, rejection above), but Mennig in view of Loxley are silent as to how the metallic substrate

is formed so neither explicitly teach wherein the substrate has been subjected to a cold forming. Callister teaches that cold forming (strain hardening / cold working) is a well known metallurgical process, which predictably improves a metal articles (such as steel) strength and hardness properties when conducted (see, for example, pg 169-171). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a substrate that has been subjected to a cold forming since such an incorporation would improve the metals strength and hardness, increasing the articles possible uses to situations requiring such properties.

### ***Response to Arguments***

Applicant's amendments to claims 44 and 56, see "at least 350°C", and "at least about 120°C", filed 7/6/10, with respect to the rejection(s) of claim(s) 44 and 56 under 35 USC over Mennig in view of Hench have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Mennig in view of Horne, and Mennig in view of Loxley as described in the rejections above.

Applicant's arguments filed 9/24/10 with respect to Examiner's assertion of new matter with regard to applicant's 7/6/10 amendment of the claims have been fully considered but they are not persuasive. The examiner asserts that claims 44 and claims 56 recite the claim limitations "at least 350°C" and "at least about 120°C"; such ranges would cover all temperatures equal to and above 350°C and 120°C respectively. The Applicant argues that temperatures "up to" 400°C, 350°C, and 500°C would support

such a limitation, but the examiner is not convinced as "up to" would mean temperatures including and below, not temperatures including and above. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the first heating should preferably be at least (350°C / 120°C ), but preferably no higher than about (400°C/ 500°C) are not recited in the rejected independent claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Further with respect to these arguments in view of further limiting claims 45, 47, 48, 59, 61, and 62 there is inadequate support to selectively exclude temperatures below 350°C and below 120°C; especially considering when exemplary embodiments (examples, 1 and 2) appear to direct the reader to such explicitly recited / and amended to be avoided ranges (temperatures up to 350 / 120).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHAN H. EMPIE whose telephone number is (571)270-1886. The examiner can normally be reached on M-F, 6:45- 4:15 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Nathan H Empie/  
Examiner, Art Unit 1712